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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/664,717

09/16/2003

John Kevin Behel

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4413

7590

06/15/2004

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EXAMINER

NGUYEN, HAI L

ART UNIT

PAPER NUMBER

2816

DATE MAILED: 06/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/664,717

Applicant(s)

BEHEL ET AL.

Examiner

Hai L. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 25-28 is/are allowed.
- 6) ☒ Claim(s) 1-12 and 17-23 is/are rejected.
- 7) ☒ Claim(s) 13-16 and 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 16 September 2003.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: page 9, lines 4-10; most of the reference numerals do not match to reference numerals of corresponding elements in the drawings. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In claim 1, the recited limitation “variable-gain amplifier that provides a mixer output signal in response to first and second input signals”, on line 1, is not enabled by the present specification because with such limited structure limitation, as recited in the claim, it is not understood how the instant invention can perform the claimed function “provides a mixer output signal”. In other word, that claimed function is the function of mixing the input signals.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: the structural and/or functional connections between the second input signal and other elements of the variable-gain amplifier in the claims. In order for the variable-gain amplifier provides a mixer output signal the structural cooperative relationships of the second input signal with the others elements need to be included in the claims (see page 7, line 9 through page 9, line 15).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 6-10, 12, and 17-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vorenkamp et al. (US 6,591,091) in view of Rauhala (US 6,564,043).

With regard to claim 12, Vorenkamp et al. discloses in Figs. 36-44b a variable-gain amplifier comprising an attenuator (3601) configured to receive the first input signal (3614) and have a plurality of taps that provide successively-attenuated tap signals; a plurality of transconductance cells (3603) that are each coupled to receive a respective one of the tap signals; and an inherent multiplexer that routes a control current (4402) to enable at least a selected one of the transconductance cells and provide therefrom a

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current signal whose amplitude corresponds to the tap signal of the selected transconductance cell. Figs. 36-44b of Vorenkamp et al. shows a variable-gain amplifier meeting all of the claimed limitations, except for a transistor switch (90 in instant Fig.3). Rauhala teaches in Figs. 6-7 a circuit having a transistor switch (71 excluding 61) arranged to multiply the first and second input signals to thereby provide a mixer output signal as recited in the claim. Since Fig. 6 of Rauhala and the variable-gain amplifier of Vorenkamp et al. are similar because they are variable-gain amplifier, it would have been obvious to one of ordinary skill in the art at the time of applicant's invention was made to implement that mixing circuit taught by Rauhala in Fig. 36 of Vorenkamp et al. for the advantage of being able to multiply the input signals for providing an output signal to meet the specific condition of the particular application.

With regard to claims 17-20 and 22, the references also meet the recited limitations in these claims (see Figs. 36-44b of Vorenkamp et al.).

With regard to claim 21, the references (Rauhala) also meet the recited limitations in this claim.

Claims 1 and 6-10 are similarly rejected; note the above discussion with regard to claims 12, 17-20, and 22.

8. Claim 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vorenkamp et al. in view of Rauhala, as applied to claim 12 above, and further in view of Twomey (US 6,564,043).

The above discussed the circuit of the references meets all of the claimed limitations except for cascode transistor (86 in instant Fig.3). Twomey teaches in Fig. 1 a variable-gain mixer including at least one cascode transistor (70, 72, 74, 76) inserted to

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couple the current signal of the selected transconductance cell (23) to the transistor switch (20) as recited in the claim. Therefore, it would have been obvious to one of ordinary skill in the art at the time of applicant's invention was made to implement the cascode transistor taught by Twomey in the circuit of the references for the advantage of being able to provide a constant common mode voltage.

Allowable Subject Matter

9. Claims 25-28 are allowed.

The prior art of record does not disclose or suggest a frequency converter (as shown in Fig. 7) whose gain corresponds to a control word (41), as recited in claim 25, comprising an oscillator (186); a variable-gain mixer (184 as 80 of Fig.3) that includes an attenuator (83s); a plurality of transconductance cells (84s); and specifically the limitation directed to a multiplexer (32) that receives a first segment (M) of the control word; a gain interpolator (104) that provides first and second control currents (I1 and I2) with amplitudes that correspond to a second segment (N) of the control word wherein, in response to the first control word segment, the multiplexer routes the first and second control currents to enable and adjust the gain of a selected adjacent pair of the transconductance cells and provide therefrom first and second current signals in response to the selected pair's respective tap signal; and a transistor switch (86) arranged to multiply the first and second current signals with the local oscillator signal to thereby provide a mixer output signal (50) with a gain that corresponds to the control word (41).

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10. Claims 13-16 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not disclose or suggest a variable-gain mixer (as shown in Fig. 3) that provides a mixer output signal (50) in response to first and second input signals (38, 48), as recited in claims 13 and 14; and specifically the limitation directed to a gain interpolator (104) that, in response to a second segment (N) of the control word, provides the control current (I1, I2) to the multiplexer (32).

The prior art of record does not disclose or suggest a variable-gain mixer (as shown in Figs. 3 and 6) that provides a mixer output signal (50) in response to first and second input signals (38, 48), as recited in claim 24; and specifically the limitation directed to a plurality of cascode transistors (162s) that are inserted to each couple a respective one of the transconductance cells (84s) to the transistor switch (90); a plurality of resistors (164) each coupled between a respective adjacent pair of the cascode transistors; and a current source (166) coupled to drive a bias current (168) through the resistors to thereby vary a bias signal of the trans conductance cells.

Conclusion

11. Regarding claims 2-5 and 11, the patentability thereof cannot be determined because of their lack of enablement and indefiniteness.


12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. For example, Kuo (US 6,510,314) is cited as of interest because it discloses a mixer circuit with output stage for implementation on integrated circuit.

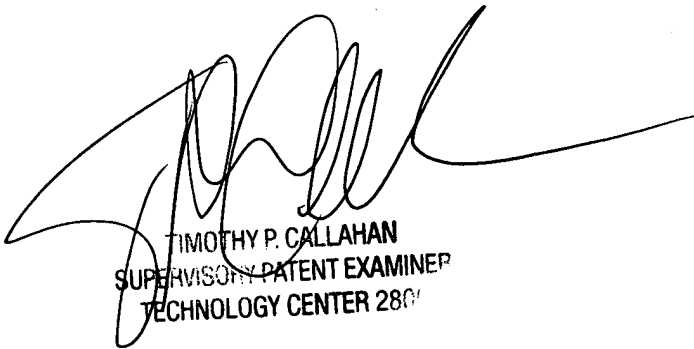
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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai L. Nguyen whose telephone number is 571-272-1747 and Right Fax number is 571-273-1747. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Callahan can be reached on 571-272-1740. The official fax phone number for the organization where this application or proceeding is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1562.

HLN 
June 2, 2004


TIMOTHY P. CALLAHAN
SUPERVISORY PATENT EXAMINER
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